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Page 1.

PAPER # 1

1 FLUORESCENT HANGING LIGHT FIXTURE  
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3 0001 This application under 37 CFR 1.53 (b,2) is a continuation-  
4 in-part of ser. no. 09/870,976, filed 06/01/2001, for  
5 FLUORESCENT HANGING LIGHT FIXTURE, having the same inventor.

7 BACKGROUND OF THE INVENTION

8 0002 Fluorescent hanging light fixtures, up to the present  
9 have a shroud fastened to the ceiling, or are mounted in  
10 recessed openings in the ceiling, and the ballast is mounted  
11 in the concave side of the shroud. This present invention  
12 discloses a hangable fluorescent light fixture with elongated  
13 fluorescent light tubes, mounted on the concave side of  
14 elongated reflectors and the elongated reflectors attached to  
15 socket mount/wire raceway arms of the fluorescent light fixture  
16 frame.

17 SUMMARY OF THE INVENTION

18 0003 Disclosure is made of a fluorescent light fixture 1,  
19 having elongated light reflectors 4, and each end of  
20 the light reflectors 4, attached to socket mount/wire raceway  
21 arms 6, attached to ends of ballast channel assembly 2, and  
22 sockets 5, for elongated fluorescent light tubes 3 mounted on  
23 socket mount/wire raceway arms 6 at each end of the elongated  
24 light reflectors 4 on the concave side, and elongated fluo-  
25 rescent light tubes 3, inserted into fluorescent light tube  
26 sockets 5 on the concave side 4'' of the elongated light  
27 reflectors 4, and the elongated light reflectors 4 having a  
28 parabolic shape in cross section, to control down light

29 0004 In the following specification and claims the terms

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DATE FEB 22 2002

Page 2.

PAPER # 1

1

2 "light reflectors" and "fluorescent light tubes" includes  
3 "elongated light reflectors" and "elongated fluorescent light  
4 tubes", identified as linear fluorescent bi-pin tubes.

5 **0005** An object of this invention of a fluorescent light  
6 fixture assembly 1 including a fluorescent light fixture  
7 frame 12 a ballast channel assembly 2 and socket mount/wire  
8 raceway arms 6, attached to the ballast channel assembly 2  
9 and fluorescent light reflectors 4, attached to the socket  
10 mount/wire raceway arms 6, and fluorescent fixture tube  
11 shunted sockets 5, 5' attached to the socket mount/wire raceway  
12 arms 6, and the fluorescent fixture tube sockets 5, 5' located  
13 under each end of the fluorescent light reflectors 4, and  
14 fluorescent dual pin light tubes 3, inserted into the fluores-  
15 cent fixture tube shunted sockets 5, 5' under the reflectors 4,  
16 and an electric power source 7 into the light fixture assembly  
17 and a switch on/off 20 mounted on the ballast channel  
18 assembly, and the power connected to the ballast 23  
19 components mounted in the ballast channel assembly 2.

20 **0006** Another object is to disclose elongated fluorescent  
21 light reflectors of new geometry and assembly to better reflect  
22 elongated fluorescent tube light downward.

23 **0007** Another object is to disclose a fluorescent light tube  
24 assembly having a plurality of eight elongated fluorescent  
25 light tubes aligned parallel side by side in an assembled  
26 fluorescent light fixture, and an elongated reflector over each  
27 of the elongated fluorescent tube lights, and only one ballast  
28 for a total plurality of at least two to eight elongated fluo-  
29 rescent light tubes in the light fixture.

30 **0008-** Another object of this invention is to disclose  
31 rim edges, bent outwards, on edges of elongated light  
reflectors having a cross section of a modified inverted U.

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FILE # OR-1-02

DATE FEB 22 2002

Page 3

PAPER # 1

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2       **0009-**                    PRIOR ART  
3

- 4       The following U.S. Patents are cited as prior art.  
5       2,619,583 to BAUMGARTNER for LUMINAIRE FOR ELONGATED  
6       LAMPS. This patent discloses a housing over the back of  
7       the reflectors  
8       3,247,368 to McHUGH for FLUORESCENT LIGHTING FIXTURE.  
9       This discloses the lights grouped under a hood and does  
10      not include individual reflectors.  
11      4,674,015 to SMITH for FLUORESCENT LIGHT FIXTURE WITH  
12      REMOVABLE BALLAST. Disclosure is made of a plug in  
13      ballast on the spine of the fixture.  
14      4,814,954 to SPITZ for RIGID LIGHTWEIGHT FLUORESCENT  
15      FIXTURE. Disclosure is made of a reflector positioned  
16      between double walled end panels, which are connected  
17      to one another by a double walled elongated box like  
18      structure.  
19      4,928,209 to RODIN for LIGHTING APPARATUS. This patent  
20      discloses a reflector, having tube hangers one reflector  
21      for each pair of tubes, and the reflectors mounted in a  
22      cover.  
23      5,062,030 to FIGUEROA for CUSTOMIZED LIGHT REFLECTOR.  
24      This patent discloses reflectors mounted in existing  
25      fixtures.  
26      5,192,129 to FIGUEROA for CUSTOMIZED LIGHT REFLECTOR.  
27      This patent discloses light reflecting planes installed  
28      in a lighting fixture.

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Page 4.

PAPER # 1

1           **0010-**       BRIEF DESCRIPTIONS OF DRAWINGS

- 2           Fig. 1 - Top plan view.  
3           Fig. 2 - Cross section of fixture.  
4           Fig. 3 - End elevation view.  
5           Fig. 4 - Front elevation view.  
6           Fig. 5 - Perspective view.  
7           Fig. 6 - Bottom plan view.  
8           Fig. 7 - Perspective view of fluorescent light fixture  
9           assembly.  
10          Fig. 8 - Fluorescent light fixture frame.  
11          Fig. 9 - Perspective view of fluorescent light  
12           reflectors.  
13          Fig. 10 - Wiring diagram of fluorescent light fixture  
14           frame.  
15          Fig. 11 - Cross section of ballast channel.  
16          Fig. 12 - Cross section of socket mount arm wire  
17           raceway  
18          Fig. 13 - Reflector segments with slots.  
19          Fig. 14 - Cross section of single reflector fixture.  
20          Fig. 15 - Perspective view of single reflector light  
21           fixture assembly.  
22          Fig. 16 - Cross section view of geometry of fluorescent  
23           tube light reflector.  
24          Fig. 17 - Cross section view of alternate geometry of  
25           fluorescent tube light reflector.  
26          Fig. 18 - Magnified cross section exploded view of fluore-  
27           scent reflectors before assembly.  
28          Fig. 19 - Magnified cross section view of fluorescent  
29           reflectors adjoining on being assembled in light  
30           fixture.  
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FILE # OR-1-02

DATE FEB 22 2002

Page 5

PAPER # 1

0011- LEGENDS OF DRAWINGS

LEGEND	DESCRIPTION
1 -----	Top plan view of assembled fluorescent light fixture.
2, -----	Ballast channel assembly.
2', -----	Ballast channel bottom.
2'' -----	Ballast channel cover.
3 -----	Fluorescent light tubes.
4 -----	Fluorescent light tube reflectors.
4' -----	Convex side of reflectors.
4''-----	Light reflector channels/concave side of reflectors.
5 -----	Fluorescent fixture tube sockets.
5' -----	Fluorescent fixture tube sockets, connected in series
6 -----	Socket mount/wire raceway arms.
6' -----	Bottom section of channel socket mount/wire raceway arm.
6'' -----	Top cover section of channel socket mount/wire raceway arm.
7 -----	Electric power source into the light fixture assembly apparatus.
8 -----	Hanger mounts.
9 -----	Screw mounts.
10 -----	Hanger wire/chain.
11 -----	Rim edges on length of fluorescent light reflectors.
12 -----	Fluorescent light fixture frame.

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FILE # OR-1-02

DATE FEB 22 2002

Page 6

PAPER # 1

LEGENDS

DESCRIPTION

- 13 ----- Anchor rivets, bolts or screws for attachment of light reflectors to socket mount arms.
- 14 ----- Apertures for fasteners attaching reflectors to socket mount arms.
- 15 ----- Fasteners for attaching top of ballast channel to ballast channel bottom.
- 16 ----- Wires in arms of fixture frame.
- 17 ----- Aperture slots for insertion of snap fit fluorescent light tube sockets.
- 18 ----- Slots in reflectors.
- 19 ----- Fasteners to attach reflectors to socket mount arms.
- 20 ----- Switch on/off.
- 21 ----- Single fluorescent light tube fixture.
- 22 ----- Ballast channel assembly for single fluorescent light tube
- 22' ----- Ballast channel bottom for single fluorescent light tube.
- 22'' -- Ballast channel cover for single fluorescent light tube.
- 23 --- Ballast
- D ----- Diameter of fluorescent light tube. Fig. 16
- d ----- Distance between top surface of fluorescent light tube and arc of reflector. Fig. 16.
- d' ---- Distance between edges of reflector. Fig. 16
- C ----- Distance from bottom of fluorescent light tube to line extending from edge to edge of reflector. Fig. 16.

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FILE # OR-1-02

DATE FEB 22 2002

Page 7.

PAPER # 1

LEGENDS

DESCRIPTIONS

- R --- Radius of arc of reflector. Fig. 16.  
H ----- Height of reflector. Fig. 16  
W ----- Distance between edges of reflector.  
Fig. 17.  
R'----- Radius of arc of reflector. Fig. 17.  
Ht --- Height of reflector. Fig. 17.  
S ----- Distance from bottom of fluorescent light  
tube to line extending from edge to edge  
of reflector. Fig. 17.  
T --- Distance between top surface of fluorescent  
light tube and arc of reflector. Fig. 17  
Blue - Individual wires for one end of each fluore-  
scent light tube sockets 5.  
Red -- One wire from ballast to fluorescent  
light tube sockets connected in series 5'

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FILE # OR-1-02  
DATE FEB 22 2002

Page 8.

PAPER # 1

1                   **0012-**           DETAILED DESCRIPTION

2                   The disclosure of this invention includes mounting of  
3                   a plurality of elongated fluorescent light tubes in a plurality  
4                   of elongated reflectors, and a ballast mounted in the assembled  
5                   elongated fluorescent light fixture.

6                   **0013-** The invention described herein discloses a fluorescent  
7                   light fixture apparatus having downlight and suspended from  
8                   the ceiling; and each fluorescent tube light mounted in its  
9                   own reflector 4 for maximum "down light", and each reflector  
10                  4 attached to fluorescent light fixture frame 12. The  
11                  fluorescent light fixture apparatus may be for direct  
12                  downlight or semi-direct, in which case there may be slots in  
13                  the top surface of the reflectors. (see sec. 12, page 169  
14                  in "STANDARD HANDBOOK FOR MECHANICAL ENGINEERS" by BAUMEISTER  
15                  and MARKS (seventh edition)

16                  **0014-** The fluorescent light fixture 1, top plan view Fig. 1  
17                  apparatus of this invention varies from the prior art, in  
18                  that in this invention, each fluorescent light tube 3, (Figs.  
19                  2, 5, 6 and 7) in the fixture assembly 1, (Figs. 6, 7) is  
20                  mounted in its own light reflector channel 4'' (Figs. 2, 3, &  
21                  6), on the concave side 4'' of the reflector 4 (Fig. 9).  
22                  The light reflectors 4, are attached to the socket mount/wire  
23                  raceway arms 6, by anchor rivets, bolts or screws 13, at each  
24                  end of the light reflector channels 4''. see Fig. 7. Fluores-  
25                  cent fixture tube shunted sockets 5 are mounted in aperture slots  
26                  17, for insertion and snap fit of fluorescent tube sockets 5  
27                  on the socket mount/wire raceway arms 6 (Figs. 3, 5, & 6) of  
28                  assembled fluorescent light fixture apparatus.

29                  **0015-** Referring now to fluorescent light fixture frame 12

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FILE # OR-1-02

DATE FEB 22 2002

Page 9.

PAPER # 1

(Fig.8) showing a plan view of a figure H shape, with arms 6 extending outward and perpendicular to the ends of ballast channel assembly 2. and in each socket mount/wire raceway arm 6, apertures 17 for insertion of snap fit fluorescent fixture tube shunted sockets 5 and 5'. Ballast 23, for the fluorescent light tubes 3, is mounted in the ballast channel assembly 2 and electric power source 7 into light fixture apparatus 1, and a switch 20 for on/off of the power from the power line 7 to the ballast 23 in the ballast channel assembly 2.

**0016-** The ballast channel assembly 2, may be likened to a spine, attached to the socket mount/wire raceway arms 6.

**0017-** Fig. 7 is a perspective view of assembly components of the fluorescent light fixture of this invention, with the light reflectors 4, attached to the socket mount/wire raceway arms 6 by fasteners 19.

**0018-** Fig. 9 shows isolated light reflectors 4 and apertures 14 for fasteners to attach reflectors to socket mount arms 6.

**0019-** Fig. 13 shows reflectors having slots 18 in reflectors thus the "light" of the fixtures in addition to having the light go downward the light can also go upwards, but in a lesser amount.

**0020-** Fig. 14 is a cross-section view of a single fluorescent light fixture, and a single reflector 4, and ballast 23 mounted in ballast mounting channel assembly 22, and showing ballast channel bottom 22' and ballast channel cover 22'' fitting over the ballast channel bottom 22'.

**0021-** Fig. 15 is a perspective view of a single fluorescent

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FILE # OR-1-02

DATE FEB 22 2002

Page 10.

PAPER # 1

1 light fixture 21, and the ballast 23 mounted in ballast  
2 channel assembly 2.

3 **0022-** Cross section view of socket mount/wire raceway arm 6  
4 is shown in Fig. 12, and the arms 6 are assembled from bottom  
5 section channel of socket mount/wire raceway 6' and top cover  
6 channel section of socket mount/wire raceway 6'', fitting  
7 together lengthwise and held in position by suitable screws  
8 or rivets to provide the socket mount/wire raceway arm 6,  
9 and wires 16, in arms 6 of fluorescent light fixture frame  
10 12, (see Fig. 8) assembly.

11 **0023-** Referring now to Fig. 10, the wiring schematic is shown  
12 and the ballast 23 is shown mounted in ballast channel  
13 assembly 2, and as shown in Fig. 11, is an assembly of a  
14 ballast channel bottom 2', and a ballast channel cover 2''  
15 fitting lengthwise over ballast channel bottom 2' and this  
16 assembly held together by conventional screws 15.

17 **0024-** The electric power source 7 into the light fixture  
18 apparatus and on/off switch 20 connected to the power source  
19 is shown in Figs. 1, 3.

20 **0025-** The Fluorescent light fixture 1, may hang from a ceiling  
21 on hanger wire/chain 10 attached to hanger mounts 8, or to  
22 screw mounts 9.

23 **0026-** Reference is now made to Fig. 8, fluorescent light fixture  
24 frame 12 and the fluorescent light tube reflectors 4, are mounted  
25 on the fixture frame 12, as shown in Fig. 7 perspective view of  
26 fluorescent light fixture assembly, and the rim edges 11 on each  
27 long edge of each reflector 4, and on assembly of the reflectors  
28 4 on the light fixture frame 12, the rim edges 11 of the  
29 reflectors 4 overlap as shown in Fig. 19 to give added  
30 stability or rigidity to the assembled light fixture.

31 Reference is now made to Figs. 16, 17, and 18 showing cross  
section of rim edges 11 of elongated reflector edge rims 11.

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FILE # OR-1-02

DATE FEB 22 2002

Page 11.

PAPER # 1

1       0027- The following is a description of the cross section  
2       geometry of light reflectors 4, to insure maximum light  
3       reflection downward from the fluorescent light tubes 3.  
4       Referring to Fig. 16, wherein it is shown the fluorescent  
5       tube 3, having a diameter D, then the radius R of the bend  
6       of the reflector 4 is  $D \times 0.875$ , and the arc at the bend of  
7       the reflector is equal to  $120^\circ$ , and reflector sides are  
8       tangent to the radius at the ends of the arc, and these  
9       reflector sides extend outward to a dimension d' equal to  
10       $3.25 \times D$ , between the edges of the reflector 4, and the  
11      distance d between the fluorescent light tube 3 and the arc  
12      of the bend of the light reflector is  $0.375 \times D$ . The  
13      distance C is equal to  $0.5 \times D$ .

14      0028 Reference is now made to Fig. 17, in which the cross  
15      section of reflectors 4 is shown, and the parabola shape  
16      compared to Fig. 16, is to reduce the dispersion of light  
17      out of the sides of the fluorescent light fixture assembly

18      1. The reflectors 4 of Fig. 17 are described as the  
19      fluorescent light tube 3, having a diameter D, then the  
20      radius R' of the bend of the reflector 4 is  $D \times 0.875$ , and  
21      the arc at the bend of the reflector is equal to  $160^\circ$ , and  
22      the sides of reflector 4, are tangent to the radius at the  
23      ends of the arc, and these sides of reflectors 4 extend out-  
24      ward to a dimension W equal to  $2 \times D$ , between edges of  
25      reflector 4 sides. The distance d between the top of  
26      fluorescent light tube 3, and the arc of the reflector is  
27      equal to  $0.375 \times D$ .

28      0029- Note the height of the arc of reflector 4, as shown in  
29      Figs. 16 and 17, is 1.8" which is approximate height to indi-  
30      cate possible scale, and may be more or less as desired.

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FILE # OR-1-02  
DATE FEB 22 2002

Page 12.

PAPER 1

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2 0030- The distance S, between the bottom of the fluorescent  
3 light tube 3, and the line W between the edges of reflector  
4, is equal to 0.25 X D.

5 0031- In all of the above description and formulas, the "X"  
6 stands for "multiplication" or "times".

7 0032- Comparing Figs. 16 and 17, it is readily seen that  
8 shortening "W" as shown in Fig. 17 then will focus light  
9 downward with less light then extending out of the sides of  
10 the fixture assembly 1, thus this invention discloses a  
11 method to control light downward in a fluorescent light  
12 fixture.

13 0033- The method of focusing downlight of a fluorescent  
14 hanging light fixture 1 by reflectors 4 over each  
15 fluorescent light tube 3, a reflector 4 extending the  
16 length of the fluorescent light tube 4, and the cross  
17 section of the reflector 4, is an arc straddling the  
18 fluorescent light tube 3 and a space of 0.375 times diameter  
19 of the fluorescent light tube 3 from the fluorescent light  
20 tube 3 and the arc of the reflector 4 having a radius of  
21 0.875 times the diameter of the fluorescent light tube 3  
22 and the arc ranging from 120° to 160° and the sides of  
23 the reflector 4, tangent at each end of arc range of  
24 reflector 4.

25 0034- The reflector 4, of this invention may be of  
26 polished sheet metal or metal coated plastic, or metal  
27 coated glass.

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FILE # OR-1-02

DATE FEB 22, 1997

Page 13

PAPER # 1

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3       **0035** To further describe the elongated reflectors 4 of this  
4 invention, in cross section the shape is a modified inverted  
5 U, and the two edges of the elongated reflectors are bent  
6 outwards to form rim edges 11, on the length of each edge see  
7 Figs. 16,17 and 18. The rim edges 11 overlap as shown in  
8 Fig. 19 on assembly of the fluorescent light fixture.

9       **0036** The specification and drawings disclose a fixture  
10 apparatus having six elongated reflectors, and six elongated  
11 fluorescent light tubes but this invention is not limited to  
12 that number, and includes any number of elongated reflectors and  
13 elongated fluorescent light tubes of from two to a total of  
14 eight reflectors and eight fluorescent light tubes and one  
15 ballast in the assembly.

16       **0037** Reference is made to Fig. 4, front elevational view of  
17 assembled fluorescent light fixture, and Fig. 10 is a plan view  
18 of the light fixture and schematic of the wiring from the  
19 ballast 23 to the fluorescent light sockets with the single wire  
20 Red from the ballast to the sockets 5' connected in series, and  
21 a single Blue wire from the ballast 23 to each of the sockets 5.

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